Do Parents Choose the Sex of their Children? Evidence from Vietnam

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ABSTRACT

The paper finds imbalance of sex ratio at birth and analyzes some possible determinants on sex ratio at birth in Viet Nam by using the Vietnam Population Census 2009. This paper concentrates to analyze the parental interference of child sex. Although the magnitude of correlation between the parental characteristics and the gender of children is not high, this correlation is statistically significant. The result of this paper concludes that gender of the firstborn, birth order, ethnicity of parents, the age of parents as well as their education level are associated with the sex of children. More specifically, having the firstborn boy reduces the probability of having boys in the next birth. Children with higher birth order are more likely to be male. It implies that parents follow male-preferring stopping rule. Several households are more likely to have children until they get a boy. Kinh parents with higher education are more likely to have boys than ethnic minority parents with lower education.

JEL Classification: J13, J1, I2,

Keywords: Sex selection, gender inequality, population census, Vietnam.

INTRODUCTION

Currently, the issue of gender equality is attracting attention in all over the world because of their implications. The UNFPA's experts are concerning about the negative impact of gender equality and the climate change; such as sex tourism, domestic violence and conflict world (war). Gender inequality happens all over the world. The highest ratio is in China (108) due to one – child policy applied in this country, followed by India, where sons are much preferred than daughters at 107 boys/100 girls and other countries including America, Nigeria and Pakistan also experience the problem respectively at 106, 104 and 106 boys to 100 girls (World Population Prospects, 2012). For China and India, it may take several years to bring this ratio to normal. Previously, gender equality is negative because of different factors and primarily due to the war, labor migration. Actually, the factor contributing to SRB increase is sex selection techniques and the biological SRB affection.

The sex ratio at birth is defined as the number of boys being born per one hundred girls in the same year. SRB is considered a demographic ratio. The sex ratio at birth is commonly found among 104 to 106 boys to 100 girls since boys have higher death rates than girls which leads to the fact that SRB tends to balance in the adulthood - based on the law for the survival of human (UNDP, 2009).

In the last 20-30 years, gender imbalance at birth has been an alarming issue in several countries in Asia, particularly in China with SRB = 120.6 (some provinces have even reached above 130 such as Jiangxi, Anhui, Shaanxi) and SBR = 110, 6 in India (UNFPA, 2010). In 1992-1993, Vietnam did not witness out gender imbalance at birth or gender imbalance in children (Haughton and Houghton, 1995). Nonetheless, sex ratio at age 0 calculated in the 1999 census result raised to 105.2 but lower than 110 in the country (Bélanger, 2003). As the result, it did not attract attention to SRB at that time. Some studies reflected the gradual soar of SRB since the end of 2000, about 20 years later than the similar trend in China and India (Guilmoto et al, 2009; UNFPA, 2009); and a SRB of 110.6 in 2010 (UNFPA, 2010). This ratio reflects an alerting situation that needs to be intervened by both short – term and long-term solutions to get back to the normal one.

In reality, gender imbalance varies from countries to countries. High SRB detected from birth statistics nonetheless appears to be always linked three group factors: a strong

preference for boys in society, the availability of both prenatal sex identification and abortion facilities, and low or moderate fertility levels (UNFPA, 2011a).

Firstly, patriarchy began a long time ago, which is the result of economic conditions – social and cultural settings and son preference. Arguments in favour of boys seem to stem logically from many features which were typical of Asian and Confucius socio-cultural and economic settings. For example, investment in sons than daughters is believed to bring more 'return' to families within a kinship system characterized by transfers from married sons to ageing parents, the customary in a patrilineal kinship system (UNPFA, 2009). Actually, in feudal societies where social welfare hardly existed, parents used to be rely on their sons when they became old; consequently, sons were more reliable for parents. Next, it is mostly with reference to costs arising during or after their marriage that daughters appear to be more expensive than sons (costs incurred during the wedding by bride's family; dowry was paid in kind or cash by the bride's family to the groom's) (Guilmoto, 2007b). Social systems are supported by the argument about man supremacy: Son is essential to their parents because they bring on family lines and names; perform ancestral worship. In addition, people prefer sons to daughter not only because of the 'intrinsic' value of male children but also because having a son improves a woman's status in the family and confirms a man's reputation in the community (UNPFA, 2011b). In Northern India, it was common to celebrate the birth of a boy and bemoan that of a girl (Bhaskar, 2008).

Secondly, nowadays, with the technology advancement, son preference is well supported by the advancement of science, which allows sex selection to be conducted more easily and become more and more popular (reference). Baby gender prediction consists of one part of sex selection. Many parents intentionally make interventions so as to choose their babies' gender before the conception through several methods, for instance, praying, going on a diet or using ovulation test trip. Another method is ultrasound scanning which allows us to check some information of the baby through his/her mother's signals as well as some traditional experimental knowledge, for instance, a mother with small pregnant belly will probably give birth to a baby boy, a mother preferring sweet foods will probably give birth to a baby boy while a mother preferring sour foods will probably give birth to a baby girl, a mother will look more beautiful if she is having a baby boy or look less beautiful if she is having a baby girl. These experiences can help to identify a baby's gender, and for the

parents who want to do sex selection, they will use an advanced method – amniocentesis – and will probably have an abortion is necessary.

In addition, the development of health care services also supports sex selection, including ultrasonic, amniotic fluid, etc. The 2007 annual Population Survey conducted by the General Statistics Office (GSO) also indicated that 63.5% of recent mothers knew the gender of their child in advance. This proportion exceeded 80% among graduates and urban residents, while a majority among women who are illiterates, who delivered birth at home or who wanted more children in the future stated that they were unaware of the gender of their baby prior to its birth (UNFPA, 2009). Prenatal sex determination is actually essential for sex selective abortion. Transabdominal ultrasound is widely accessible in Vietnam, with accuracy in determining fetal sex of between 80.0 and 98.7 % at the 12^{th} week of gestation (Efrat, 1999; Whitlow et al, 1999). The high sex ratio of most recent births likely reflects the spread of prenatal sex selection practices in health facilities (Pham et al, 2011).

SRB has been growing gradually and increasingly in Vietnam. This study aims to examine whether there is a problem of sex selection using household-level data. This paper is structured into six sections. The second section presents the literature review. The third section presents the data set and methodology. The four and fifth sections presents empirical analysis. Finally the sixth section concludes.

LITERATURE REVIEW

The study is researched by Pande and Malhotra (2006) used a fixed effects model to analyze 3 resources: (1) Severe stunning (World Health Organization standard) as the height-for-age in a sample of 14, 715 children ages 6-47 months; (2) level of immunization among a sample of 25, 549 children ages 12-60 months; and (3) Rural sample of 50, 136 ever-married women from the NFHS date (1992-1993); Their analysis found the determinants of son preference at the community level, which in turn affects the sex ratio are village level economic development as measured by access to roads, health care facilities and media exposure; and village level status of women as measured by female literacy and employment outside the home. Besides, they found that wealth does not reduce son preference.

The study used panel date with district and village as dimension by Mohana (2012). The result analyses show that female literacy was found to be insignificant, the same finding of Chakrborty and Sinha (2006) and it contrary to the expected result. But both marginal work female and main work female are found to be significant.

The study shows that literacy rate in females and occupational status of male workers engaged as agricultural labors have been a positive impact on sex ratio (Chakrabarth and Chaudhuri, 2011). Labor force participation rate and literacy rate in females were found significant to lessen sex ratio (Klasen and Claudia, 2003).

The study used Panel method to analyses from resources: The Saguenay population and the BALSAC Population Register. The result analyses from show that seasonal variations have influence to SRB (the month of March has a particularly from high ratio of 110.2) from 1930-1971; the young father has not seen high value although has seen high value (Chahnazarian, 1988). However, the age of father appears to have a positive and significant effect have positive on the male proportion (between 35 -45) and this is opposite to the effect seen for mothers between the ages of about 30-37 from 1850-1971; tendency for the sex ratio to rise with birth order; shorter birth interval (less than 10 months) have a positive effect of the ratio (this also applies to the marriage to first birth interval) and longer interval, there does not appear to be an obvious trend; the sex of the preceding birth could have some influence on the sex ratio in this population. The probability of having a boy is higher when the preceding birth is also a boy and the same result (Biggar et al, 1999) that births of a given sex are more often followed by births of that same sex than of the other sex.

The study of Guilmoto (2008) finds out India women with better education tends to have higher sex ratio at birth. This finding explains for positive education effect on SRB increase through women has access to information and financial ability of access medical services. The same result, mother with higher education appear more likely to have a son than the less educated (Ebenstein, 2010). On contrary, other studies shows education also plays a role in reducing SRB in India. The conditional sex ratio for second-order births decreases much greater in mother with 10 or more years of education than those with no education (Jha et al., 2011). Mother's education has positive effect on decline SRB for first order but not significant for second order (Yang, 2006).

The data provided by the national Census 1999 did not clearly show the increasing sex ratio in Vietnam (Belanger et al., 2003). Nevertheless, the sex ratio soared rapidly in the next decade (UNPFA, 2009).

Sex selection has relation with several factors. It is believed to have the link with the increased accessibility of sex determination technology in private health care in urban and semi – urban areas (UNFPA, 2009). Firstly, the popularity of advanced technology especially ultra – sound which was firstly introduced in 1990s and became popular in 2005, become over – used in urban Vietnam, especially among higher economic group remains at the primary position (Becquet and Guilmoto, 2013). For instance, 70% of mothers in 2006 knew their baby's sex during antenatal period compared to 60% in 2003 thanks to the popularity and reduction in access cost. Secondly, these authors also point out the relation between geographical factor and sex selection, that birth masculinity is not normally distributed but dramatically unequal over the country while; in Central Highland, the sex ratio remains close to normal; but stays elevated at 120/100 in Red River Delta. Last but not least, the level of education and the economic status certainly contribute to sex selection. Better – off and/or well educated mothers, who mainly live in big cities and are able to afford costly technology, are more likely to "choose" their baby's sex thanks to advance technology. UNFPA (2009) refers that 87% of women with graduate degree know their baby's sex; even though not all of them will commit any acts of gender discrimination; nonetheless, they have the first condition for sex selection. In general, SRB escalates from 103 for illiterate women (which are very close to normal) to 113 for women with a graduate degree.

DATA AND RESEARCH METHODOLOGY

Data source

The data will be used in this research is 15 percent of the 2009 Population and Housing Census (VPHC). The Census is third Census in Viet Nam and was implemented at the beginning of 1st April, 2009 followed the Prime Minister's Decision No. 94/2008/QD-TTg dated 10th July, 2008. It aimed at collecting basic information on population and housing of Socialist Republic of Viet Nam for national development planning for the period of

2011-2020. The Census shows that the total of population of Viet Nam is 85,789,573 people. Administrative structure has 4 levels as country, provinces/cities (63 units), districts (690 units) and communes (11,055 units). The country was divided into 172,000 enumeration areas. Enumeration can be blocks, villages, and hamlets…with an average size of about 100 households. In addition to the full census, the census contain a special module which was used to collect more detailed in households and individuals from random sample of 15 percent of the population. This sample covered 3,692,042 households with 14,177,590 individuals.

The questionnaire of Census consists of 41 questions divided in two main sections of the questionnaire: first part of the population survey questionnaire consists of 19 questions for all people and 13 questions for 3% population sample on fertility of women and the status of the households deaths and second part of the population survey questionnaire consists of 9 questions survey on housing.

The Census has a series of questions that are useful to study on determinants of parents on sex of child. The Census's questionnaire asked about: 1, individual characteristics (full name, sex, the date of birth) 2, relationship to head of household; 3, ethnic and religion; 5, literacy; 6, highest level of professional qualification completed; 7, number of children ever born; 8, the date of the last birth, and total number of sons and daughters at that last birth.

After 10 years, population increases 9.47 millions, average 947 thousand people per year. The average of population growth rate between two Censuses is 1.2%. It is lower than the previous 10-year period from 1989 to 1999 at 1.7% (preliminary Census of 2009) and compared with the previous 20 years from 1979 to 1989 at 2.1. The average percentage of population decline over the years means that the fertility rate of women decreased.

In this study, the number of children is defined in family and the number of children having the same biological mother. The same time, we can define the sex of the last children of mother in order to know the sex ratio of the last children. The result of sex ratio of the children provides information about the different between son and daughter on the same year.

Research methodology

In this study, we test whether parental characteristics are correlated with gender of children. If they do not select gender of their children, then there is no correlation between their characteristics and gender of their children since gender is random. Linear regression – ordinary least squares (OLS) method is used to estimate the effect of parents' factor on sex of child.

The first, we regress sex of children (1 for boy and 0 for girl) on the explanatory variables we mentioned above. The relation is measured through the follow standard function:

$$Y_i = \alpha + \beta X_i + \varepsilon_i,$$

Where Y_i is gender of child i, and X_i is a vector of characteristics of parents of child i. The list of X variables is presented above.

The interaction between birth order and other predictor variables will be used to study variability of the impacts among different variables. Separate regressions on each of interactions between birth order and control variables including age of child, urbanity, ethnicity, age of mother, age of father, number of schooling year of mother, number of schooling year of father will be conducted. The coefficients of these interactions will help to find the relationship between different factors.

It should be noted that although our dependent variable is dummy, we use Linear Probability Model instead of probit or logit models. Linear probability model also produces unbiased estimates (Wooldridge, 2010). Interpretation of linear probability models is straightforward, and we do not need to estimate marginal effects like the probit or logit models. Compared with probit or logit model, the linear probability model has one limitation: the prediction of the dependent variable can be out of range from 0 to 1. However, in this study, we are interested in the effect of explanatory variables. We do not predict the fitted values for specific observations.

Sex was entered as dependent variable. Sex is a person's biological status and is typically categorized as male, female, or intersex (i.e., atypical combinations of features that usually distinguish male from female) when he/she was born. Sex is confirmed son or daughter. Through sex ratio at birth (SRB) is reported as the number of males per 100 females to know more male or vice versa. Sex1 is gender of the first child. In this thesis, we select children sample from 0 – 5 years of age.

Independent variables are factors which we expect those have effects on sex of child. There are some factors as follow:

- The birth order of child (denoted as “b_order”) is expressed by the linking with other child and date of birth determines the order of the children in sibling relationships.
- The age of child (denoted as “age”) is expressed the age from 0-5 year of child. All children were born from April 2nd 2008 to April 1st 2009 called 0 year.
- The urban is expressed the place of parents live when they born their child.
- The Kinh is expressed the ethnic of parents and child.
- The age of father (denoted as Father_age) is expressed the age of father when he has child.
- The age of mother (denoted as Mother_age) is expressed the age of mother when he has child.
- The number of schooling years of father (denoted as Father_ysch) is expressed the education level of father of child
- The number of schooling years of mother (denoted as mother_ysch) is expressed the education level of mother of child

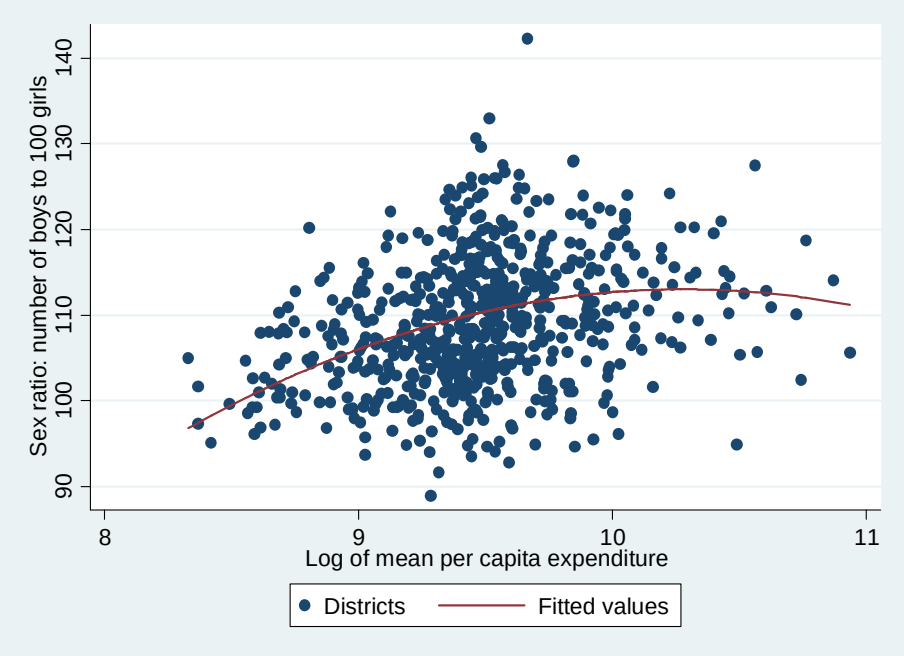
OVERVIEW OF SEX RATIO AT BIRTH IN VIET NAM

The sex ratio at birth is known to have gradually increased in some Asian countries and several countries in other areas over nearly decades. In special regions, SRB has even reached extreme values of 125 or 130 and above (UNFPA, 2011a). Not only in country of South and East Asia, such as China and India in Asia are known highest SRB where has highest population, but also in Southeast Europe and the South Caucasus. High SRB with declining fertility can has big impact with other countries and threat global demographic stability.

This graph describes the relation between per capita expenditure and sex ratio at birth calculated in different districts in Vietnam. In this graph, fitted line is at a high SRB, showing that the higher per capita expenditure one district has the higher probability of

having sons it has. The graph presents a fact that SRB is between 105 and 115 in many districts. In addition, many SRB results scatter in a symmetric arrangement around the fitted line, which proves a uniform distribution of districts with higher SRB and those with lower SRB.

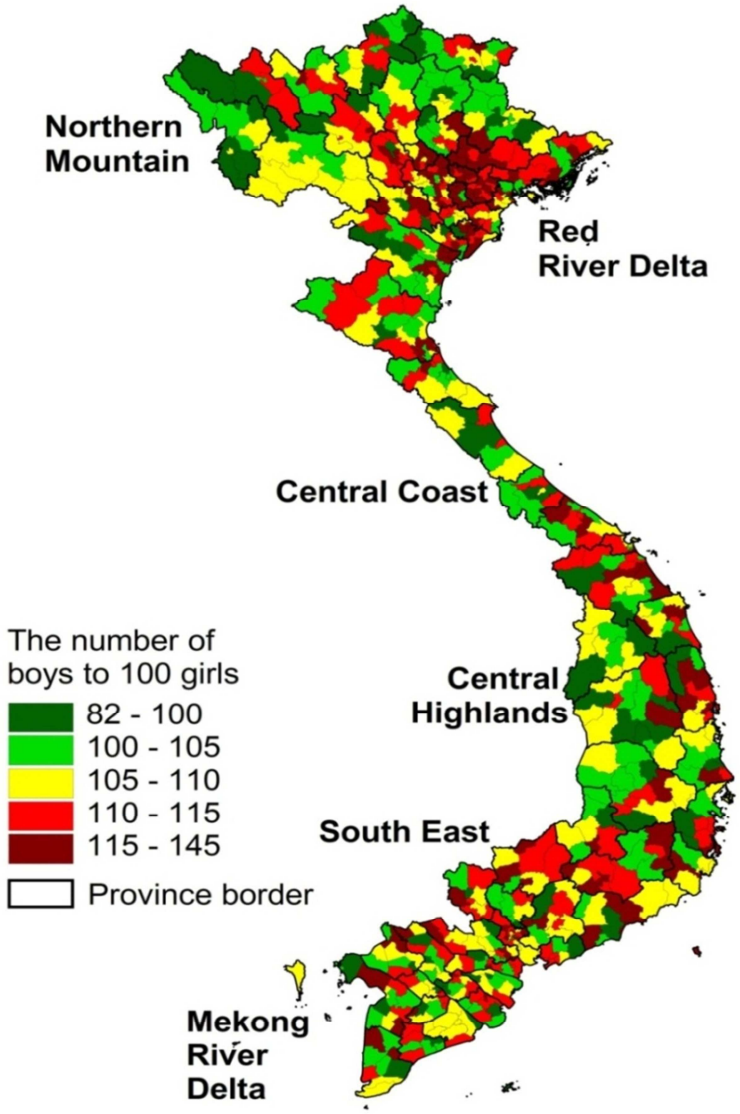
Figure 1: Sex ratio and mean expenditure



Source: author's estimation from the 2009 VPHC

Figure 2 demonstrates that the difference in SRB among different districts or provinces is much bigger than the difference in SRB among different regions.

Figure 2: Sex ratio at birth by district in Vietnam



The country can was divided by class or region or ethnicity. Table 1 shows that there is a not big difference among areas or classes. Sex ratio (0 – 5 years) in rural is lowest in 104.9 lower than class 2 by 2 points. Sex ratio (0 – 5 years) in Northern Mountain is highest in 106.7 higher than Mekong River Delta by 2.6 points. Sex ratio (6 - 10 years and 11 - 14 years) have not highlight among classes or regions. It shows that has higher SRB in recent years and has immigration among classes and regions when children have higher age.

Table 1: Sex ratio (number of boys to 100 girls)

	Age 0-5	Age 6-10	Age 11-14	Total
Special cities	106.2	104.8	104.0	105.3
Class 1	105.1	106.0	104.2	105.1
Class 2	107.0	104.2	104.5	105.6
Class 3	106.6	104.7	104.0	105.3
Class 4 & 5	105.7	104.4	104.6	105.0
Rural	104.9	103.9	104.0	104.4
Red River Delta	104.7	103.5	103.8	104.1
Northern Mountain	106.7	104.6	103.9	105.3
Central Coast	105.2	104.1	104.1	104.5
Central Highland	104.5	104.1	103.9	104.2
South East	105.6	104.5	104.7	105.0
Mekong River Delta	104.1	103.8	104.2	104.0
Ethnicity				
Kinh majority	105.6	104.3	104.2	104.8
Ethnic minorities	103.5	103.3	103.7	103.5
Total	105.3	104.1	104.1	104.6

Source: author's estimation from the 2009 VPHC

Table A1 and A2 in Appendix show that Ben Tre province's SRB (99.3) is markedly different from Hung Yen province SRB (128.5). They are the two provinces with the lowest district-level SRB (84.7) belong to Ben Tre province and the highest district-level SRB (164) belong to Hung Yen province in the country. There are about 13 provinces (approximately 20% of the total number of provinces) that have higher SRB than the average ratio, and up to 33 provinces/cities (over 50% of the total number of provinces) that have SRB higher than 110, including up to 9 provinces that have SRB higher 115. Particularly, Hai Duong and Hung Yen have SRB higher than 120, and these two provinces also have many districts with SRB higher 130. In contrast, the provinces in Central Highlands have SRB at a normal level (Dak Lak, Dak Nong, Gia Lai with SRB of 105.2; 103.8; 102.5, respectively) and some provinces in the northern mountain (Ha Giang, Bac Kan, Lai Chau with SRB of 103.6; 97.7; 99.8, respectively).

Some provinces with high provincial SRB and district-level SRB scatter in different regions, especially in the Red River delta provinces nearby to Hanoi (Hung Yen, Hai Duong, Bac Giang, Bac Ninh) and southern provinces nearby to HCMC (Tra Vinh, Dong Thap, Tien Giang, Vinh Long, Dong Nai). It is noticeable that the provinces with the highest SRB are provinces of agricultural production (Hung Yen, Hai Duong, Bac Ninh, Bac Giang) and the provinces with high level of urbanization (Hai Phong, Ha Noi, Ho Chi Minh) do not have similar situation.

EMPIRICAL FINDINGS

OLS regression of child gender on birth order of child and other control variables is shown tables 2 and 3.

Table 2: OLS regression of child gender on birth order of child and other control variables

	Model 1	Model 2	Model 3	Model 4
Explanatory variables	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)
Birth order	0.0021***	0.0056***	0.0021***	0.0023***
	(0.0007)	(0.0012)	(0.0008)	-0, 0008
Age of child	-0.0016***	0.0006	-0.0016***	-0.0016***
	(0.0003)	(0.0006)	(0.0003)	(0.0003)
urban	-0.0017	-0.0017	-0.0011	-0.0017
	(0.0015)	(0.0015)	(0.0029)	(0.0015)
kinh	0.0036**	0.0035**	0.0036**	0.0043*
	(0.0014)	(0.0014)	(0.0014)	(0.0026)
Age of father	0.0004***	0.0004***	0.0004***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age of mother	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of schooling year of father	0.0006***	0.0007***	0.0006***	0.0006***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Number of schooling year of mother	0.0012***	0.0012***	0.0012***	0.0012***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Age of child * birth order		-0.0011***		
		(0.0003)		
Urban * birth order			-0.0004	
			(0.0014)	
Kinh * birth order				-0.0003
				(0.0011)
Constant	0.5080***	0.5010***	0.5079***	0.5074***
	(0.0031)	(0.0039)	(0.0031)	(0.0033)
Observations	1, 186, 816	1, 186, 816	1, 186, 816	1, 186, 816
R-squared	0.000	0.000	0.000	0.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1.
Source: author's estimation from the 2009 VPHC.

Table 3: OLS regression of child gender on birth order of child and other control variables

Explanatory variables	Model 5 Gender of child (boy=1, girl=0)	Model 6 Gender of child (boy=1, girl=0)	Model 7 Gender of child (boy=1, girl=0)	Model 8 Gender of child (boy=1, girl=0)
Birth order	-0.0001	-0.0018	-0.0011	-0.0001
	(0.0027)	(0.0024)	(0.0010)	(0.0009)
Age of child	-0.0016***	-0.0016***	-0.0016***	-0.0016***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
urban	-0.0017	-0.0017	-0.0012	-0.0013
	(0.0015)	(0.0015)	(0.0015)	(0.0015)
kinh	0.0036***	0.0036***	0.0024*	0.0025*
	(0.0014)	(0.0014)	(0.0014)	(0.0014)
Age of father	0.0002	0.0004***	0.0003***	0.0003***
	(0.0002)	(0.0001)	(0.0001)	(0.0001)
Age of mother	-0.0004***	-0.0006***	-0.0004***	-0.0004***
	(0.0001)	(0.0002)	(0.0001)	(0.0001)
Number of schooling year of father	0.0006***	0.0006***	-0.0004	0.0006***
	(0.0002)	(0.0002)	(0.0004)	(0.0002)
Number of schooling year of mother	0.0012***	0.0012***	0.0012***	0.0004
	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Age of father * birth order	0.0001			
	(0.0001)			
Age of mother * birth order		0.0001		
		(0.0001)		
Number of schooling year of father * birth order			0.0005***	
			(0.0002)	
Number of schooling year of mother * birth order				0.0004***
				(0.0002)
Constant	0.5120***	0.5149***	0.5159***	0.5137***
	(0.0060)	(0.0055)	(0.0035)	(0.0033)
Observations	1, 186, 816	1, 186, 816	1, 186, 816	1, 186, 816
R-squared	0.000	0.000	0.000	0.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1.
Source: author's estimation from the 2009 VPHC.

If the eldest son, the second order births may wish to have daughters, but they will not have a strong incentive to choose, but if that first daughter was born, the next time they will use interventions to have a son and will be increasingly determined son (if the previous births without sons). Through the result of table 3, we have the birth order variable is significant at 0.01 and it also has a positive coefficient, which describes that parents have higher probability to give births to sons in the higher birth orders.

The table 3 express the age of child is significant at 0.01 and it has a negative coefficient. The age of child variable has contribution to explain the change on sex ratio. The age of child increase 1 year make sex ratio decrease 0.0016 unit the same meaning when the age of child increase 1 year which makes the son decrease 0.0016 unit other way 1000 sons,

after 1 year the remain sons are 984 sons. The older the age is, the lower number of males is, which may be explained by the situation that male children's mortality rate is higher than female children's mortality rate.

The urban variable is not significant on table 3, thus the urban variable is not affected to Sex of child. We also see all regions and classes in the whole country have not the big different of sex ratio on table 2. This result shows that district and province with high and low sex ratio are interleaved so we cannot see the difference between urban and rural.

Through table 3, we can easy to see The Kinh variable is significant at 0.05 and it has a positive coefficient. The kinh variable has affect on sex of child means the kinh has son more than daughter. This proves that Kinh have access to better health services and have information on sex selection so they have the ability to use the intervention of sex selection to have at least one son in comparison with other ethnic groups.

The age of father and mother variables is significant at 0.001 and we have the opposite effect. If his age increases by one year, the probability of having sons increases by 4/10000 and opposite with the age of mother. The change from a male to a female leads excess of new born with the increasing age of mother (Juntunen et al, 1997).

The number of schooling year of father and mother variable is significant at 0.001 and they have positive coefficient. The effect of the number of schooling year of mother on sex ratio bigger than the effect of the number of schooling year of father. They have high education level means they have opportunity to find and understand on sex selection.

These factors do have influence on SRB such as birth order, age of child, ethnic, father’s age, mother’s age, the number of schooling year of mother, the number of schooling year of father but with a provided R-squared of approximately 0, these influences are not considerable enough. The fluctuation of SRB is possibly a random change, which cannot be explained by any of those factors.

It also shows similarities and differences in the interaction effects computed through OLS. OLS shares signs and significance level of interaction birth order for each variable to investigate the influence of age of children, urban, kinh, age of mother, age of father, number of schooling year of mother, number of schooling year of father variables on sex

selection in different birth orders. Thus, below discussion focus on the interaction effects of estimation method.

First, the impact of urban, kinh, father's age and mother's age variable on sex selection are not significant. Thus, these variables have not effect to change in different birth orders. The father' age has strong and positive effect in the first birth order and no change in the second or higher birth order that mean the father desire strongly to have a son at the first time and remain if in the previous birth without son.

Second, the impact of the age of child to birth order is significant at 0.01 and it has a negative coefficient, which presents that the sex of child has higher birth order when the preceding child has a few years (less than 3 years old).

If the first child is a son, although they like girls, but they are less user-friendly methods to have choose the sex of child, but they will quickly use interventions to have early birth son in inversely. The distance between first and second order is long, they try to have a child, whether male or female.

By contrast, the interaction between birth order and parents' years of schooling is significant at 1% level. Coefficients of interaction have a positive impact on sex selection. Well – education and experienced parents want at least son so they have an intervention in the next children.

After we have results of impact of Child gender on birth order of child and other control variables, we continue regression of Child gender on first-born child gender and other control variables. This means we drop children who have first birth order. Table 5 and 6 show the result of impact of Child gender on first-born child gender and other control variables.

Table 4: OLS regression of Child gender on first-born child gender and other control variables

	Model 1	Model 2	Model 3	Model 4
VARIABLES	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)	Gender of child (boy=1, girl=0)
Birth order	0.0027***	0.0026***	0.0027***	0.0027***
	(0.0010)	(0.0010)	(0.0010)	(0.0010)
age	-0.0024***	-0.0040***	-0.0024***	-0.0024***
	(0.0004)	(0.0006)	(0.0004)	(0.0004)
urban	-0.0026	-0.0026	-0.0024	-0.0026

VARIABLES	Model 1 Gender of child (boy=1, girl=0)	Model 2 Gender of child (boy=1, girl=0)	Model 3 Gender of child (boy=1, girl=0)	Model 4 Gender of child (boy=1, girl=0)
	(0.0020)	(0.0020)	(0.0028)	(0.0020)
kinh	0.0020	0.0020	0.0020	0.0021
	(0.0018)	(0.0018)	(0.0018)	(0.0024)
Age of Father	0.0005***	0.0004***	0.0005***	0.0005***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Age of mother	-0.0002	-0.0002	-0.0002	-0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Number of schooling year of father	0.0009***	0.0009***	0.0009***	0.0009***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Number of schooling year of mother	0.0011***	0.0011***	0.0011***	0.0011***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Firstborn child gender (boy=1, girl=0)	-0.0152***	-0.0256***	-0.0151***	-0.0150***
	(0.0015)	(0.0028)	(0.0017)	(0.0027)
Age of child * Firstborn child gender		0.0034***		
		(0.0007)		
urban * Firstborn child gender			-0.0003	
			(0.0035)	
kinh * Firstborn child gender				-0.0002
				(0.0032)
Constant	0.5075***	0.5126***	0.5075***	0.5074***
	(0.0044)	(0.0044)	(0.0044)	(0.0046)
Observations	747, 599	747, 599	747, 599	747, 599
R-squared	0.001	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1.
Source: author's estimation from the 2009 VPHC.

Table 5: OLS regression of Child gender on first-born child gender and other control variables

VARIABLES	Model 5 Gender of child (boy=1, girl=0)	Model 6 Gender of child (boy=1, girl=0)	Model 7 Gender of child (boy=1, girl=0)	Model 8 Gender of child (boy=1, girl=0)
Birth order	0.0027***	0.0026***	0.0026***	0.0026***
	(0.0010)	(0.0009)	(0.0010)	(0.0009)
age	-0.0024***	-0.0024***	-0.0024***	-0.0024***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
urban	-0.0025	-0.0025	-0.0025	-0.0025
	(0.0020)	(0.0020)	(0.0020)	(0.0020)
kinh	0.0019	0.0019	0.0020	0.0020
	(0.0018)	(0.0018)	(0.0018)	(0.0018)
Age of Father	0.0007***	0.0005***	0.0004***	0.0004***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Age of mother	-0.0002	0.0001	-0.0002	-0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Number of schooling year of father	0.0009***	0.0009***	0.0013***	0.0009***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Number of schooling year of mother	0.0011***	0.0011***	0.0011***	0.0016***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Firstborn child gender (boy=1, girl=0)	0.0035	0.0086	-0.0086***	-0.0078***
	(0.0085)	(0.0076)	(0.0029)	(0.0027)
Age of father * Firstborn child gender	-0.0005**			

VARIABLES	Model 5 Gender of child (boy=1, girl=0)	Model 6 Gender of child (boy=1, girl=0)	Model 7 Gender of child (boy=1, girl=0)	Model 8 Gender of child (boy=1, girl=0)
	(0.0002)			
Age of mother * Firstborn child gender		-0.0007***		
		(0.0002)		
Number of schooling year of father * Firstborn child gender			-0.0009**	
			(0.0004)	
Number of schooling year of mother * Firstborn child gender				-0.0011***
				(0.0004)
Constant	0.4985***	0.4961***	0.5046***	0.5043***
	(0.0062)	(0.0060)	(0.0047)	(0.0047)
Observations	747, 599	747, 599	747, 599	747, 599
R-squared	0.001	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1.
Source: author's estimation from the 2009 VPHC.

If parents have son as the first child, it reduces the demand for sex selection at the next birth. After having a son as the first child, parents may expect a daughter but may not make sex selection, which leads to lower probability of sex selection for the second child. Gender of the first child has a profound influence on the gender of the second child so R-squared increases to 0.001. The birth order, the age of child, the age of father, the number of schooling year of father and mother are significant at 0.001. The birth order, the age of father, the number of schooling year of father and mother has positive coefficient means that the effect variables contribute to explain the desire to have a son at first child and the next child.

We continue to interact the child gender on first-born child gender and other control variables. We can see the result of models on the table 4 and 5. The age of father variable on first-born child gender is significant at 0.05 and it has negative coefficient, this result expressed that if the first child is a boy, the demand on sex selection in the next birth reduce and if the first child is a girl, the demand on sex selection in the next birth increase strongly. The age of mother, the number of schooling year of parents have the same impact of the age of father.

CONCLUSIONS

We have studied SRB increase through some elements such as birth order which influences SRB in the way that there will be lower possibility of sex selection if the first child is a son,

and in opposite, there will be higher possibility of sex selection if the first child is a daughter. People do not usually make sex selection for the first child. However, if their first child is a daughter, they will probably use gender intervention/selection to have a son in the next child.

Ethnic group - as one variable - does have an impact on SRB. The number of males is bigger than the number of females among Kinh people, which shows that there is an intension to apply technologies to intervene sex selection, and high level of education, science and technology development help Kinh people make sex selection to satisfy their son preference.

Parents' levels of education influence the probability of having sons, and mothers' levels of education have bigger influence on children's sex. Well-educated person who have economic so two factors go hand in hand together. Well - educated parents have the ability to easily access information in many ways. They have many relationships so that they have access to services option that is considered to be banned. They also can more easily control themselves. They want something, they will try to achieve.

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APPENDIX

Table A.1: Sex Ratio at birth by Province

No.	Province	SRB	No.	Province	SRB
1	Đắk Lắk	105, 2%	32	Khánh Hòa	107, 3%
2	Đắk Nông	103, 8%	33	Kiên Giang	110, 0%
3	ĐồngNai	112, 5%	34	Kon Tum	106, 0%
4	Đồng Tháp	108, 6%	35	Lai Châu	99, 8%
5	Đà Nẵng	105, 6%	36	Lâm Đồng	115, 2%
6	An Giang	111, 9%	37	Lạng Sơn	104, 8%
7	Bạc Liêu	110, 8%	38	Lào Cai	110, 2%
8	Bắc Ninh	118, 5%	39	Long An	108, 7%
9	Bến Tre	99, 3%	40	Nam Định	115, 9%
10	Bà Rịa – Vũng Tàu	105, 6%	41	Nghệ An	109, 8%
11	Bắc Giang	116, 4%	42	Ninh Thuận	109, 0%
12	Bắc Kạn	99, 7%	43	Ninh Bình	113, 0%
13	Bình Dương	100, 0%	44	Phú Thọ	114, 5%
14	Bình Định	111, 0%	45	Phú Yên	111, 9%
15	Bình Phước	109, 2%	46	Quảng Nam	103, 2%
16	Bình Thuận	109, 4%	47	Quảng Ngãi	112, 6%
17	Cần Thơ	116, 0%	48	Quảng Bình	112, 1%
18	Cà Mau	111, 2%	49	Quảng Trị	105, 9%
19	Cao Bằng	107, 2%	50	Quảng Ninh	111, 9%
20	Điện Biên	104, 9%	51	Sóc Trăng	110, 2%
21	Gia Lai	102, 5%	52	Sơn La	102, 3%
22	Hồ Chí Minh	109, 5%	53	Tây Ninh	109, 7%
23	Hải Dương	120, 7%	54	Thừa Thiên Huế	113, 2%
24	Hải Phòng	114, 6%	55	Thái Nguyên	110, 4%
25	Hưng Yên	128, 5%	56	Thái Bình	112, 7%
26	Hậu Giang	109, 3%	57	Thanh Hóa	111, 3%
27	Hà Giang	103, 6%	58	Tiền Giang	112, 1%
29	Hà Nam	110, 3%	59	Trà Vinh	115, 7%
30	Hà Nội	113, 7%	60	Tuyên Quang	103, 2%
31	Hà Tĩnh	102, 6%	61	Vĩnh Long	111, 5%
32	Hòa Bình	113, 0%	62	Vĩnh Phúc	114, 3%
			63	Yên Bái	109, 3%

Table A.2: Sex ratio by age and provinces (number of boys to 100 girls)

Provinces	Age 0-5	Age 6-10	Age 11-14	Total
City Hà Nội	106.5	105.3	103.2	105.4
Province Hà Giang	102.5	102.0	103.1	102.5
Province Cao Bằng	102.2	101.2	103.8	102.4
Province Bắc Kạn	103.0	103.0	102.2	102.8
Province Tuyên Quang	104.1	103.4	103.3	103.7
Province Lào Cai	105.2	102.7	103.5	103.9
Province Điện Biên	103.1	102.9	105.3	103.6
Province Lai Châu	104.4	104.4	106.8	104.9
Province Sơn La	104.0	103.3	104.3	103.9
Province Yên Bái	104.1	103.1	102.7	103.4
Province Hoà Bình	105.2	103.0	102.5	103.8
Province Thái Nguyên	105.6	104.2	103.3	104.5
Province Lạng Sơn	103.2	103.4	103.4	103.3
Province Quảng Ninh	107.1	104.2	104.5	105.5
Province Bắc Giang	108.6	103.8	103.6	105.6
Province Phú Thọ	105.4	105.8	105.1	105.4
Province Vĩnh Phúc	108.2	104.0	102.6	105.4
Province Bắc Ninh	108.6	104.2	103.9	106.0
Province Hải Dương	107.8	105.4	104.4	106.1
City Hải Phòng	105.2	104.7	105.2	105.1
Province Hưng Yên	110.2	104.1	104.0	106.7
Province Thái Bình	105.3	103.4	104.5	104.5
Province Hà Nam	104.8	104.0	103.3	104.1
Province Nam Định	105.4	103.9	104.6	104.7
Province Ninh Bình	105.3	104.7	104.4	104.8
Province Thanh Hoá	105.5	104.1	105.4	105.1
Province Nghệ An	105.0	103.3	102.9	103.8
Province Hà Tĩnh	104.6	104.7	103.3	104.2
Province Quảng Bình	103.6	102.9	103.7	103.4
Province Quảng Trị	103.5	103.1	104.6	103.7
Province ThừaThiênHuế	104.9	104.5	102.9	104.1
City Đà Nẵng	107.4	105.0	106.6	106.5
Province Quảng Nam	105.5	103.8	104.3	104.6
Province Quảng Ngãi	105.4	104.6	103.8	104.6
Province Bình Định	106.7	104.1	103.8	105.0
Province Phú Yên	105.1	103.8	104.6	104.5
Province Khánh Hoà	104.3	104.7	104.5	104.5
Province Ninh Thuận	105.5	104.5	104.3	104.8
Province Bình Thuận	104.9	104.7	104.0	104.6
Province Kon Tum	105.0	104.6	104.2	104.7
Province Gia Lai	103.7	104.0	104.0	103.9
Province Đắk Lắk	104.6	104.6	104.1	104.4

Provinces	Age 0-5	Age 6-10	Age 11-14	Total
Province Đắk Nông	104.5	105.7	106.0	105.3
Province Lâm Đồng	105.2	102.4	102.4	103.5
Province Bình Phước	106.7	104.3	104.7	105.4
Province Tây Ninh	105.5	104.5	103.6	104.6
Province Bình Dương	102.8	105.3	107.0	104.5
Province Đồng Nai	105.7	104.5	104.2	104.9
Province BàRịa - VũngTàu	106.0	104.0	104.7	105.0
City Hồ Chí Minh	106.0	104.5	104.6	105.2
Province Long An	104.4	104.1	105.3	104.6
Province Tiền Giang	105.0	103.0	105.2	104.4
Province Bến Tre	103.6	102.5	103.6	103.2
Province Trà Vinh	104.3	104.5	104.7	104.5
Province Vĩnh Long	103.8	102.5	102.5	103.0
Province Đồng Tháp	103.3	103.6	105.2	104.0
Province An Giang	104.4	103.7	103.0	103.8
Province Kiên Giang	103.8	103.6	104.6	104.0
City Cần Thơ	104.2	106.9	104.3	105.1
Province Hậu Giang	104.4	104.3	103.1	104.0
Province Sóc Trăng	103.9	104.1	103.6	103.9
Province Bạc Liêu	103.8	104.1	103.6	103.8
Province Cà Mau	104.5	103.5	105.0	104.3
Total	105.3	104.1	104.1	104.6

Source: author's estimation from the 2009 VPHC